

## Resistance to Electrolytes

225

764. On interposing two amalgamated zinc plates, fig. 61, instead of one, there was still a powerful current, but interference had taken place. On using three intermediate zinc plates, fig. 62, there was still further retardation, though a good current of electricity passed.

765. Considering the retardation as due to the inaction of the amalgamated zinc upon the dilute acid, in consequence of the slight though general effect of diminished chemical power produced by the mercury on the surface, and viewing this inaction as the circumstance which rendered it necessary that each plate should have its tendency to decompose water assisted slightly by the electric current, it was expected that plates of the metal in the unamalgamated state would probably not require such assistance, and would offer no sensible impediment to the passing of the current. This expectation was fully realised in the use of two and three interposed unamalgamated plates. The electric current passed through them as freely as if there had been no such plates in the way. They offered no obstacle, because they could decompose water without the current; and the latter had only to give direction to a part of the forces, which would have been active whether it had passed or not.

766. Interposed plates of copper were then employed. These seemed at first to occasion no obstruction, but after a few minutes the current almost entirely ceased. This effect appears due to the surfaces taking up that peculiar condition (776) by which they tend to produce a reverse current; for when one or more of the plates were turned round, which could easily be effected with the *couronne des tasses* form of experiment, fig. 50, then the current was powerfully renewed for a few moments, and then again ceased. Plates of platina and copper, arranged as a voltaic pile with dilute sulphuric acid, could not form a voltaic trough competent to act for more than a few minutes, because of this peculiar counteracting effect.

767. All these effects of retardation, exhibited by decomposition against surfaces for which the evolved elements have more or less affinity, or are altogether deficient in attraction, show generally, though beautifully, the chemical

relations and  
source of the current, and also the balanced state  
of the affinities  
at the places of excitation and decomposition. In  
this way they  
add to the mass of evidence in favour of the  
identity of the two;  
for they" demonstrate, as it were, the antagonism  
of the *chemical*  
*powers* at the electromotive part with the  
*chemical powers* at  
the interposed parts; they show that the first  
are *producing*